

A record identification (ID) is uniquely maintained for each record in the system. Each record is located by pack ID, tape ID and record address. Using tape ID and record address, the central processing unit (CPU) controls a robotic selector for selecting the tape desired and positioning it at an available player unit. This record ID is determined by application software using user input digital data.

The analog data on the tape in the memory pack represents a substantial number of separate records. Each record is broken up into a number of segments. The segments of each record are distributed and interlaced throughout the tape in such a fashion that both the first and the last segment of a record is located close to the beginning of the tape. As the tape is scrolled the first segment of the record desired is put in a first buffer for immediate display. During the course of that display, the tape is scrolled to the second segment which is put into a second buffer that permits continuous display of the picture after the image in the first buffer has been completed. This continues sequentially until the last segment is placed in one of the buffers for display to complete the record. However the segments are so distributed in the tape that the tape initially scrolls forward locating about half of the segments of the record involved and then scrolls back until the last segment displayed is done that is close to the beginning of the tape. In this fashion, fairly immediate access is obtained to each record without having to wait for scrolling through the tape to where a record might be located if the records were simply placed on the tape in sequential fashion.

IV. THE OBJECTIVES, ADVANTAGES AND SUMMARY OF THIS INVENTION

The major objectives of this invention includes:

Physically combining digital (RAM) and analog memory (NxM tape cassette cabinet) into one unit (D/A memory pack)

Logically combining digital data and analog data into one record

Direct accessibility of any digital/analog record

The expendability of the ultra large digital/analog memory without compromising the response time

The modularization of the system architecture to allow easy adoption advanced digital computer technologies as well as TV, video technologies as they come.

In prior arts, a record is normally organized as either analog data or digital data. This invention combines logical related digital data and analog data into one record. The digital data is stored in fast speed RAM, the analog data is stored in large volume low speed media units advantages are:

1. The digital data efficiently represents number and text, analog data (such as video record) vividly describes motion pictures and sound. Both digital and analog data are needed to better describe an event, concept or message.

2. When searching, merging or sorting, only the key (digital) part is searched merged or sorted. This creates much faster result since key is in RAM, and is shorter than the entire record.

3. Use digital to drive analog data. For each record, there is a record ID as part of a digital record which is also the address of the analog part of the record in the tape matrix. (For example, A5-94-0387 means the record is at 0387 offset from the beginning of the cassette tape which is at column 9 and row 4 of the tape matrix

- A5. The vertical stepping motor and the horizontal stepping motor of the robot for matrix A5 will work simultaneously to let robot to get the tape cassette at (9,4) and move it to the tape driver. Then the tape driver will position the tape to 0387 using the current tape position table stored in the RAM).

4. With the novel magnetic tape technologies and robotic tape cassette selector to be disclosed later, digital data provides the random accessibility of data in huge analog tape library.

5. With the GLOBAL mode of the RAM of each memory pack, the key (digital) part of records in all packs can be merged, compressed and sorted to make the retrieval efficient. All the global RAMs become main memory of CPU. Contrast to most other peripheral devices, the more packs are added the more efficient the system will be due to added main memory.

To accomplish the above objectives, a data processing system with large mixed media memory packs provides:

1. Ultra large memory storage, up to hundreds of trillion bytes digital or equivalent analog information, stored in a large number of memory packs;

2. The memory packs, each of them comprising of a solid state device which stores random access memory (RAM) and a tape cabinet which stores N by M cassette tapes. Those two types of medium are physically inseparable and are mounted, stored, and shipped out as one unit;

3. A method to create, store and process DIGITAL-/ANALOG records, a DIGITAL/ANALOG record is a record comprising of digital part and analog part, both parts are logically related to be considered as a single record;

4. A direct/random accessibility to any record which consists of both digital and analog data;

5. The magnetic tape technologies in hardware and software to overcome the most disadvantage of the tape—the random accessibility of a record on the tape, includes:

Tape Access Method (TAM) - the record segmentation and the round trip recording;

Muti-reel cassette such as quint-reel cassette tape makes the random accessibility about quadruply improved;

Tape buffer pool and analog resources scheduler further reduce the random access time and support the multiprocessing;

6. Video read/write head technologies which can copy video/audio signal from one tape to another with speed 20 to 30 times faster than normal speed. The same head can also have normal speed mode;

7. Tape transporters (a specially designed shuttle and robot) to fast move the cassette tape between the cabinet bin and the play deck;

8. A programmable analog communication controller which provides efficient switching, monitoring and tally functions of a complex analog communication network. This controller can be used as a building block to form an extremely complex analog communication control;

9. A time/control trackless helical scan method which can store more data per tape length be used for both video and digital tape recording;

10. Digital coding on TV and video signal to provide addressing, delimiter, directional information;

11. Twin deck helical scan tape player which allows two cassettes to share one head drum alternatively;